# MARINE ECOLOGY
## PROGRESS SERIES

**Volume 105 (1994)**

Editor
Otto Kinne

Assistant Editor: John Austin

Editorial Assistants: Scott Hanson, Richard Hooper, John Hunt, Rosemarie Stedjee

Ecology Institute, Nordbünte 23, D-21385 Oldendorf/Luhe, Germany
Tel: (+49) (0)4132 7127; Fax: (+49) (0)4132 8883; E-mail: 100327.535@compuserve.com

**Inter-Research**

**1994**

# Editorial Advisors

Marine Ecology Progress Series (MEPS) is edited in cooperation with the Editorial Advisors (EAs) listed below and about 400 Anonymous Referees. EAs are appointed for a 4-year period; re-appointment is possible. They critically evaluate the scientific merits of submitted manuscripts. EAs recommend authors and topics for reviews to be published in MEPS. Their addresses and fields of expertise are detailed at the end of the last (3rd) issue of each volume, together with the volume contents.

Several EAs have been appointed as Senior EAs, marked below by Ⓢ; they may act as Sub-editors by processing manuscripts themselves, i.e. see them through a rigorous 3-referee evaluation process and present them to the Editor who reserves the right of final acceptance.

## ENVIRONMENTAL FACTORS

**Ahmed, S. I., Prof.**
School of Oceanography, WB-10, University of Washington, Seattle, WA 98195, USA
Physiological ecology of phytoplankton; thermophilic microorganisms

**Alderdice, D., Dr**
Pacific Biological Station, Nanaimo, B.C., Canada V9R 5K6
Responses to environmental factors

**Collos, Y., Dr** Ⓢ
Laboratoire d'Hydrobiologie, Université de Montpellier CC 093, F-34095 Montpellier Cedex 5, France
Nitrogen metabolism of phytoplankton

**Dring, M. J., Dr**
Botany Dept, The Queen's Univ. of Belfast, Belfast BT7 1NN, Northern Ireland
Physiological ecology of algae

**Fisher, N. S., Dr**
Marine Sciences Research Center, State Univ. of New York, Stony Brook, NY 11794-5000, USA
Physiological ecology of phytoplankton

**Fowler, S. W., Dr** Ⓢ
IAEA, ILMR, Stade Louis II, Entrée C-19, Ave des Castellans, MC-98000 Monaco
Trace element metabolism

**Haedrich, R. L., Prof.** Ⓢ
Memorial University of Newfoundland, St. John's, Nfld, Canada A1B 3X9
Environmental effects on fishes (incl. deep sea)

**Kasyanov, V., Dr**
Institute of Marine Biology, Academy of Sciences, Vladivostok 690032, Russia
Environmental effects on invertebrates; reproduction, development

**Kiørboe, T., Dr** Ⓢ
Danish Institute for Fisheries and Marine Res., Charlottenlund Castle, DK-2920 Charlottenlund, Denmark
Physiological ecology of zooplankton, including fishes (esp. larvae)

**Lawrence, J. M., Prof.** Ⓢ
Dept of Biology, Univ. of South Florida, Tampa, FL 33620, USA
Physiological ecology of invertebrates

**Luoma, S. N., Dr**
US Dept of the Interior, Geological Survey, Water Resources Div., 345 Middlefield Rd, Menlo Park, CA 94025, USA
Geochemical and biological factors affecting biochemical processes in invertebrates; contaminant effects on bioavailability

**McLusky, D. S., Dr** Ⓢ
Dept of Biological Sciences, Univ. Stirling, Stirling FK9 4LA, Scotland
Physiological ecology of invertebrates

**Meyer-Reil, L.-A., Dr**
Institut für Ökologie, Schwedenhagen, D-18565 Kloster/Hiddensee, Germany
Environmental effects on benthic microorganisms, benthic microbial ecology

**Meyers, S. P., Prof.** Ⓢ
Dept of Food Science, Louisiana State Univ., Baton Rouge, LA 70803, USA
Physiological ecology of microorganisms

**Paasche, E., Prof.**
Dept of Biology, Univ. Oslo, Marine Botany, PO Box 1069, Blindern, N-0316 Oslo 3, Norway
Physiological ecology of phytoplankton; primary production; benthic algae

**Rheinheimer, G., Prof.**
Institut für Meereskunde, Univ. Kiel, Düsternbrooker Weg 20, D-24105 Kiel, Germany
Marine microbiology

**Riisgård, H. U., Dr** Ⓢ
Odense Universitet, Biologisk Institut, Campusvej 55, DK-5230 Odense M., Denmark
Environmental effects on invertebrates; bioenergetics of suspension feeders

**Southward, A. J., Dr**
Plymouth Marine Laboratory, Citadel Hill, Plymouth PL1 2PB, England
Environmental effects on invertebrates

**West, J. A., Prof.**
Dept of Plant Biology, Univ. of California, 111 Genetics Plant Biology Bldg, Berkeley, CA 94720, USA
Physiological ecology and reproductive biology of estuarine and marine benthic macroalgae

**Westernhagen, H. von, Dr**
Biologische Anstalt Helgoland, Notkestr. 31, D-22607 Hamburg, Germany
Effects of pollution on marine communities

## PHYSIOLOGICAL MECHANISMS

**Alderdice, D., Dr**
Pacific Biological Station, Nanaimo, B.C., Canada V9R 5K6
Resistance to stress including pollution; regulation; adaptation

**Batty, R. S., Dr**
Dunstaffnage Marine Research Laboratory, PO Box 3, Oban, Argyll PA34 4AD, Scotland
Behavioural physiology of fish; feeding; predation of fish larvae

**Browman, H. I., Dr**
Marine Productivity Division, Maurice-Lamontagne Institute, Dept of Fisheries and Oceans Canada, C.P. 1000, Mont-Joli, Québec, Canada G5H 3Z4
Foraging behavior and development of (sensory) organs, especially in fishes

**Brown, B. E., Dr**
Dept of Biology, The University, Newcastle-upon-Tyne NE1 7RU, England
Physiology and ecology of corals

**Burton, R. S., Prof.**
Marine Biology Research Division 0202, Scripps Institution of Oceanography, University of California, 9500 Gilman, La Jolla, CA 92093-0202, USA
Population genetics; evolutionary mechanisms in populations; biochemical and molecular genetic analyses of invertebrates

**Caron, D. A., Dr** Ⓢ
Biology Dept, Woods Hole Oceanographic Institution, Woods Hole, MA 02543, USA
Feeding, respiration and nutrient regeneration of protozoans

**Chapman, A. R. O., Prof.** Ⓢ
Institut für Meereskunde, Univ. Kiel, Düsternbrooker Weg 20, D-24105 Kiel, Germany
Physiology and demography of macroalgae

**Conover, R. J., Dr**
Marine Ecology Laboratory, Bedford Institute of Oceanography, PO Box 1006, Dartmouth, N.S., Canada B2Y 4A2
Physiology and biochemistry of zooplankton

**Enright, J. T., Prof.**
Scripps Institution of Oceanography, San Diego, PO Box 1529, La Jolla, CA 92093, USA
Biological rhythms

**Forward, R. B., Jr, Dr**
Duke University Marine Laboratory Pivers Island, Beaufort, NC 28516-9721, USA
Environmental zoo-physiology; behavior; biological rhythms

**Gerking, S. D., Prof.**
Dept of Zoology, Arizona State Univ., Tempe, AZ 85281, USA
Fish physiology

**Holland, N. D., Prof.** Ⓢ
Scripps Institution of Oceanography, San Diego, PO Box 1529, La Jolla, CA 92093, USA
Comparative, cellular and developmental physiology

**Humphrey, G. F., Dr** Ⓢ
CSIRO Marine Biochemistry, Building A12, Sydney Univ., N.S.W. 2006, Australia
Photosynthesis; plankton biochemistry

**Leftley, J. W., Dr**
Dunstaffnage Marine Research Laboratory, PO Box 3, Oban, Argyll PA34 4AD, Scotland
Physiology and biochemistry of microalgae (laboratory and field); nitrogen metabolism

**Levandowsky, M., Dr** Ⓢ
Haskins Laboratories at Pace Univ., 41 Park Row, New York, NY 10038, USA
Chemosensory behavior; mathematical models

**McLusky, D. S., Dr** Ⓢ
Dept of Biological Sciences, Univ. Stirling, Stirling FK9 4LA, Scotland
Osmoregulation in estuarine invertebrates

**Naylor, E., Prof.**
School of Ocean Sciences, Univ. of Wales, Menai Bridge, Gwynedd LL59 5EY, Wales
Behavioural physiology; invertebrate biology

**Pawlik, J., Dr**
The University of North Carolina at Wilmington, Wilmington, NC 28403-3297, USA
Chemical defense of invertebrates; antifouling, chemical cues

**Puiseux-Dao, S., Prof.**
Laboratoire de Cytophysiologia végétale et de Toxicologie cellulaire, Université de Paris VII, 2 Place Jussieu, F-75251 Paris Cedex 05, France
Ecophysiology and toxicology of algae; cellular biology; behavior of algae

**Rivkin, R. B., Prof.**
Ocean Sciences Centre, University of Newfoundland, St. John's, Nfld, Canada A1C 5S7
Phytoplankton physiology and ecology

**Shick, J. M., Prof.** Ⓢ
Dept of Zoology, Univ. of Maine, Murray Hall, Orono, ME 04469-5751, USA
Physiological energetics of invertebrates, incl. metabolic calorimetry; symbioses; hyperoxia and oxidative stress; effects of UV light; sea anemone biology

**Videler, J. J., Dr**
Dept of Marine Biology, Univ. of Groningen, PO Box 14, 9750 AA Haren, The Netherlands
Swimming dynamics of plankton; activity pattern and reproductive strategies of fishes; energy budgets of herbivores

**West, J. A., Prof.**
Dept of Plant Biology, Univ. of California, 111 Genetics Plant Biology Bldg, Berkeley, CA 94720, USA
Chemistry of red algae; molecular genetics of red and green algae

**Wieser, W., Prof.**
Institut für Zoologie der Leopold-Franzens Universität Innsbruck, Technikerstraße 25, A-6020 Innsbruck, Austria
Physiological ecology of invertebrates

**Zhirmunsky, A. V., Prof.**
Institute of Marine Biology, Academy of Sciences, Vladivostok 690032, Russia
Mechanisms of cellular resistance and control

## CULTIVATION

**Lawrence, J. M., Prof.** Ⓢ
Dept of Biology, Univ. of South Florida, Tampa, FL 33620, USA
Nutrition of invertebrates

**Levandowsky, M., Dr** Ⓢ
Haskins Laboratories at Pace Univ., 41 Park Row, New York, NY 10038, USA
Microcosm cultures

**Meyers, S. P., Prof.** Ⓢ
Dept of Food Science, Louisiana State Univ., Baton Rouge, LA 70803, USA
Cultivation of microorganisms and crustaceans; aquaculture; microenvironments

**Pandian, T. J., Prof.**
School of Biological Sciences, Madurai Kamaraj Univ., Madurai 625 021, Tamilnadu, India
Cultivation of decapods and fishes; bioenergetics

**Rheinheimer, G., Prof.**
Institut für Meereskunde, Univ. Kiel, Düsternbrooker Weg 20, D-24105 Kiel, Germany
Cultivation of microorganisms

## DYNAMICS

**Ahmed, S. I., Prof.**
School of Oceanography, WB-10, University of Washington, Seattle, WA 98195, USA
Phytoplankton ecology; greenhouse gases and global ocean flux; sedimentary microbiology; mangrove ecosystems

**Alongi, D. M., Dr** Ⓢ
Coastal Processes and Resources Program, Australian Institute of Marine Science, PMB No. 3, Townsville M.C., Q. 4810, Australia
Trophic dynamics and nutrient energetics of soft-bottom benthic food webs (particularly tropical microbes and meiofauna)

**Azam, F., Prof.**
Scripps Institution of Oceanography, Univ. of California, La Jolla, CA 92093, USA
Viral and bacterial ecology; microbial biogeochemistry

**Bak, R. P. M., Dr** Ⓢ
Nederlands Instituut voor Onderzoek der Zee, Postbox 59, 1790 AB Den Burg – Texel, The Netherlands
Coral reef ecology

**Banse, K., Prof.**
School of Oceanography, WB-10, Univ. of Washington, Seattle, WA 98195, USA
Biological oceanography; plankton research

**Berman, T., Prof.**
Kinneret Limnological Laboratory, PO Box 345, Tiberias 14102, Israel
Phytoplankton ecology

**Bianchi, A., Dr**
C.N.R.S. ER 223, Microbiologie Marine, Campus de Luminy – case 907, 70, route Léon Lachamp, F-13288 Marseille Cedex 9, France
Marine microbiology; ecological dynamics

**Birkeland, C., Prof.**
Univ. of Guam, Marine Laboratory, UOG Station, Mangilao, Guam 96913
Coral-reef ecology; benthic ecology

**Brattegard, T., Dr**
Universitetet i Bergen, Institutt for fiskeri- og marin-biologi, Thormohlens gt. 55, N-5008 Bergen, Norway
Distribution and ecology of malacostracan crustaceans (esp. suprabenthic/hyperbenthic species)

**Browman, H. I., Dr**
Marine Productivity Division, Maurice-Lamontagne Institute, Dept of Fisheries and Oceans Canada, C.P. 1000, Mont-Joli, Québec, Canada G5H 3Z4
Early life history, growth and development in fishes; fish-zooplankton interactions

**Bunt, J. S., Dr**
4/6 McDonald Street, Potts Point, NSW 2011, Australia
Mangrove systems; reef studies

**Caron, D. A., Dr** Ⓢ
Biology Dept, Woods Hole Oceanographic Institution, Woods Hole, MA 02543, USA
Microbial ecology; trophic relations between planktonic protozoans and other heterotrophic and photosynthetic organisms; pelagic detrital aggregates

**Chapman, A. R. O., Prof.** Ⓢ
Institut für Meereskunde, Univ. Kiel, Düsternbrooker Weg 20, D-24105 Kiel, Germany
Community ecology of rocky shores

**Collos, Y., Dr** Ⓢ
Laboratoire d'Hydrobiologie, Université de Montpellier CC 093, F-34095 Montpellier Cedex 5, France
Nitrogen cycling and primary production

**Conover, R. J., Dr**
Marine Ecology Laboratory, Bedford Institute of Oceanography, PO Box 1006, Dartmouth, N.S., Canada B2Y 4A2
Zooplankton biology

**Cushing, D. H., Dr**
Ministry of Agriculture, Fisheries and Food, Fisheries Laboratory, Lowestoft, Suffolk NR33 OHT, England
Productivity of the sea; fish-population dynamics; biological oceanography

**Dolan, J., Dr**
Station Zoologique, C.E.R.O.V., BP 28, F-6230 Villefranche-sur-Mer, France
Microbial ecology, interactions of bacteria, protists and metazoa

**Elliott, M., Dr** Ⓢ
Dept of Applied Biology, Institute of Estuarine and Coastal Studies, The University, Hull HU6 7RX, England
Structure and function of fish and benthic communities

**Feller, R. J., Prof.**
Biology and Marine Science, Belle W. Baruch Institute for Marine Biology and Coastal Research, Columbia, SC 29208, USA
Trophic dynamics and energetics of crustaceans; feeding and digestion of fishes; benthic ecology of meiofauna; ecological applications of immunology and serology

**Fenchel, T., Prof.** Ⓢ
Marine Biological Laboratory (University of Copenhagen), DK-3000 Helsingør, Denmark
Population biology; microbial ecology

**Field, J. G., Prof.**
University of Cape Town, Zool. Dept, Rondebosch 7700, Republic of South Africa
Dynamics of nearshore ecosystems

**Floc'h, J. Y., Dr**
Université de Bretagne Occidentale, Lab. d'Ecophysiologie et de Biochimie des Algues Marines, Faculté des Sciences, 7 av. V. Le Gorgeu, BP 452, F-29275 Brest Cedex, France
Ecophysiology and biochemistry of macroalgae

**Foster, M. S., Prof.** Ⓢ
Moss Landing Marine Laboratories, California State Univ., PO Box 450, Moss Landing, CA 95039-0450, USA
Population and community ecology of macroalgae

**Fowler, S. W., Dr** Ⓢ
IAEA, ILMR, Stade Louis II, Entrée C-19, Ave des Castellans, MC-98000 Monaco
Particle flux; biogeochemistry

**Fuhrman, J., Prof.** Ⓢ
Marine Biology Res. Section, Dept of Biological Sciences, Univ. of Southern California, Los Angeles, CA 90089-0371, USA
Planktonic microbial ecology. Productivity and growth of microorganisms, especially bacteria

**Furness, R. W., Dr**
Department of Zoology, The University of Glasgow, Glasgow G12 8QQ, Scotland
Ecology of sea birds

**Furuya, K., Dr**
Faculty of Bioresources, Mie University, 1515 Kamihama, Tsu 514, Japan
Phytoplankton ecology; community structure, dynamics

**Gage, J. D., Dr** Ⓢ
Dunstaffnage Marine Research Laboratory, PO Box 3, Oban, Argyll PA34 4AD, Scotland
Benthos of deep sea and temperate coasts

**Gray, J., Prof.** Ⓢ
Institutt for Marinbiologi og Limnologi, Univ. Oslo, Postboks 1064, Blindern, Oslo 3, Norway
Soft-sediment ecology

**Haedrich, R. L., Dr** Ⓢ
Memorial University of Newfoundland, St. John's, Nfld, Canada A1B 3X9
Zoogeography; natural history of fish

**Hansen, B., Dr**
Roskilde University, Institute I, Life Sciences & Chemistry, PO Box 250, DK-4000 Roskilde, Denmark
Laboratory and in situ studies on zooplankton; secondary production (grazing, growth, energetics, feeding behaviour)

**Harding, G. C., Dr**
Marine Ecology Laboratory, Bedford Institute of Oceanography, PO Box 1006, Dartmouth, N.S., Canada B2Y 4A2
Crustacean ecology (incl. deep sea)

**Heck, K. L., Jr, Dr** Ⓢ
Marine Environmental Sciences Consortium, Dauphin Island Sea Lab., PO Box 369-370, Dauphin Island, AL 36528, USA
Benthic ecology, emphasis on seagrass ecosystems

**Holm-Hansen, O., Dr** Ⓢ
Scripps Inst. of Oceanography, Univ. of California, La Jolla, CA 92093-0202, USA
Polar ecology; chemical oceanography; photosynthesis

**Hoppe, H.-G., Prof.**
Institut für Meereskunde, Univ. Kiel, Düsternbrooker Weg 20, D-24105 Kiel, Germany
Microbiology, including methods; microbial plantology

**Hughes, R. N., Dr** Ⓢ
School of Animal Biology, Univ. College North Wales, Bangor, Gwynedd LL57 2UW, Wales
Ecological energetics (particularly feeding)

**Karlson, R. H., Prof.**
School of Life and Health Sciences Ecology Program, Univ. of Delaware, Newark, DE 19716, USA
Population and community ecology of benthic invertebrates

**Kiørboe, T., Dr**
Danish Institute for Fisheries and Marine Res., Charlottenlund Castle, DK-2920 Charlottenlund, Denmark
Biological oceanography; physical and biological processes in the pelagial with emphasis on copepods and fish larvae

**Klumpp, D., Dr**
Australian Institute of Marine Science, PMB No. 3, Townsville M.C., Q. 4810, Australia
Trophodynamics; animal nutrition, energy and nutrient budgets; nutrient cycling; primary productivity; fish biology; seagrass, coral reef, kelp bed ecosystems

**Kneib, R. T., Dr**
Marine Institute, The University of Georgia, Sapelo Island, GA 31327, USA
Population and community dynamics of estuarine fishes and invertebrates; field experimentation; growth and mortality during early life of estuarine species; evaluation of coastal wetlands

**Landry, M. R., Dr** Ⓢ
Dept of Oceanography, Univ. of Hawaii, Manoa, 1000 Pope Rd, Honolulu, HI 96822, USA
Food web interactions; zooplankton ecology

**Lawrence, J. M., Prof.** Ⓢ
Dept of Biology, Univ. of South Florida, Tampa, FL 33620, USA
Reproduction of invertebrates; nutrition

**Levandowsky, M., Dr** Ⓢ
Haskins Laboratories at Pace Univ., 41 Park Row, New York, NY 10038, USA
Ecological modelling; phytoplankton ecology

**Levings, C., Dr** Ⓢ
West Vancouver Laboratory, 4160 Marine Drive, West Vancouver, B.C., Canada V7V 1N6
Estuarine ecology of macrobenthos and fish

**Lewis, J. B., Dr**
Dept of Biology, McGill Univ., Stewart Biology Bldg, 1205 Dr. Penfield, Montreal, Quebec, Canada H3A 1B1
Coral-reef ecology; tropical marine biology

**Lewis, M. R., Dr**
Dept of Oceanography, Dalhousie University, Halifax, N.S., Canada B3H 4J1
Biological oceanography; phytoplankton physiology; modelling of physical and biological processes

**Lobel, P. S., Dr**
Woods Hole Oceanographic Institution, Woods Hole, MA 02543, USA
Fish ecology, behavior, biogeography; coral reefs; fisheries and oceanography

**Luoma, S. N., Dr**
US Dept of the Interior, Geological Survey, Water Resources Div., 345 Middlefield Rd, Menlo Park, CA 94025, USA
Feeding ecology of deposit feeders; geochemistry of trace elements in sediments

**Marcus, N. H., Dr**
Dept of Oceanography, Florida State Univ., B-169, Tallahassee, FL 32306-3048, USA
Zooplankton ecology; biology and genetics of invertebrate populations; rhythms (e.g. spawning, feeding)

**Mauchline, J., Dr**
Scottish Marine Biological Ass., Dunstaffnage Marine Research Laboratory, PO Box 3, Oban, Argyll PA34 4AD, Scotland
Deep-sea ecology; radioactive pollution

**Moriarty, D., Dr**
CSIRO Marine Laboratories, Division of Fisheries, PO Box 120, Cleveland, Qld 4163, Australia
Microbial ecology and biochemistry; role of microorganisms in bio-geochemical cycles and food webs; molecular techniques in bacterial ecology

**Nelson, D. M., Prof.**
College of Oceanography, Oregon State Univ., Oceanography Admin. Bldg 104, Corvallis, OR 97331, USA
Phytoplankton ecology; nutrient cycling

**Newell, S. Y., Dr** Ⓢ
The University of Georgia, Marine Institute, Sapelo Island, GA 31327, USA
Ecology of fungi and bacteria; decomposition

**Nybakken, J., Prof.**
Moss Landing Marine Laboratories, California State Univ., PO Box 450, Moss Landing, CA 95039-0450, USA
Ecology of molluscs; community structure of soft-sediment invertebrates

**Pawlik, J., Dr**
The University of North Carolina at Wilmington, Wilmington, NC 28403-3297, USA
Ecology and biology of invertebrate larvae; settlement; recruitment; life histories; dispersal; natural products

**Pearse, J. S., Prof.**
Center for Coastal Marine Studies, Univ. of California, Santa Cruz, CA 95064, USA
Kelp forest ecology; reproductive ecology

**Peterson, C. H., Prof.** Ⓢ
Institute of Marine Science, Univ. of N. Carolina at Chapel Hill, 3407 Arendell Street, Morehead City, NC 28557, USA
Marine benthic ecology; population biology

**Platt, T., Dr**
Marine Ecology Laboratory, Bedford Institute of Oceanography, PO Box 1006, Dartmouth, N.S., Canada B2Y 4A2
Phytoplankton ecology; primary production

**Purcell, J. E., Dr** Ⓢ
The University of Maryland Systems, Center for Environmental and Estuarine Studies, PO Box 775, Cambridge, MD 21613, USA
Zooplankton ecology and behavior; trophic dynamics; prey selection. Competition for space among benthic invertebrates

**Rassoulzadegan, F., Dr** Ⓢ
Station Zoologique, BP 28, F-06230 Villefranche-sur-Mer, France
Microbial ecology (food webs, microbial loop); pico- and nanoplankton; planktonic flagellates and ciliates; micro- and mesozooplankton; carbon flux

**Reise, K., Prof.**
Biologische Anstalt Helgoland, D-25992 List/Sylt, Germany
Benthos ecology

**Rivkin, R. B., Prof.**
Ocean Sciences Centre, University of Newfoundland, St. John's, Nfld, Canada A1C 5S7
Microbial ecology; polar planktonic processes; lower food web dynamics

**Savidge, G., Dr**
The Queen's Univ. of Belfast, Marine Biology Station, The Strand, Portaferry, Co. Down, Northern Ireland
Phytoplankton ecology; primary production; photosynthesis

**Scheltema, R. S., Dr** Ⓢ
Woods Hole Oceanographic Institution, Woods Hole, MA 02543, USA
Invertebrate larval ecology

**Schneider, D. C., Dr** Ⓢ
Newfoundland Institute for Cold Ocean Science, Memorial University of Newfoundland, St. John's, Nfld, Canada A1B 3X7
Dynamics of large organisms; ecology of sea birds

**Sherr, B. & E., Drs** Ⓢ
College of Oceanography, Oregon State Univ., Oceanography Admin. Bldg 104, Corvallis, OR 97331, USA
Microbial food webs; trophic roles of phagotrophic protozoans

**Skjoldal, H. R., Dr**
Institute of Marine Research, Postboks 1870, N-5024 Bergen-Nordnes, Norway
Food webs and trophic interactions

**Southward, A. J., Dr**
Plymouth Marine Laboratory, Citadel Hill, Plymouth PL1 2PB, England
Rocky-coast ecosystems; deep-sea ecosystems

**Stoecker, D. K., Dr** Ⓢ
Horn Point Environmental Laboratories, PO Box 775, Cambridge, MD 21613, USA
Microzooplankton particularly ciliates; secondary production

**Tenore, K. R., Prof.** Ⓢ
Chesapeake Biological Laboratory, PO Box 38, Solomons, MD 20688-0038, USA
Benthic ecology and bioenergetics; production; food chains of detritus-based systems

**Thayer, G. W., Dr** Ⓢ
Ecosystem Structure Branch, Southeast Fisheries Center, Beaufort, NC 28516-9722, USA
Wetlands ecology, incl. submerged seagrasses and emergent marshes; production and utilization of detritus

**Underwood, A. J., Dr** Ⓢ
School of Biol. Sci., Univ. Sydney, Zoology Building, Sydney, N.S.W. 2006, Australia
Experimental intertidal and subtidal ecology; behavior; life cycles of sessile invertebrates

**Vinogradov, M. E., Prof.**
P. P. Shirshov Institute of Oceanology, Academy of Sciences of USSR, 1, Letnaya (Ljublino), Moscow 109387, Russia
Oceanic plankton ecosystems; deep-sea amphipods; biological oceanography

**Wangersky, P. J., Prof.** Ⓢ
Dept of Oceanography, Dalhousie University, Halifax, N.S., Canada B3H 4J1
Organic matter in sea water; theoretical population dynamics; geochemistry; chemical oceanography

**Warwick, R. M., Dr**
Plymouth Marine Laboratory, Prospect Place, West Hoe, Plymouth PL1 3DH, England
Structure and functioning of benthic communities; meiofaunal ecology; energy flow

**West, J. A., Prof.**
Dept of Plant Biology, Univ. of California, 111 Genetics Plant Biology Bldg, Berkeley, CA 94720, USA
Reproductive dynamics of red algae; fine structure and parasites of algae

**Williams, R., Dr**
Plymouth Marine Laboratory, Prospect Place, West Hoe, Plymouth PL1 3DH, England
Plankton ecology; community structure, population dynamics

**Wu, B. L., Prof.**
First Institute of Oceanography, State Oceanic Administration, PO Box 98, Qingdao, People's Republic of China
Ecology and morphology of coelenterates, echinoderms and polychaetes. Development and reproduction of polychaetes and phoronids

## OCEAN MANAGEMENT

**Ahmed, S. I., Prof.**
School of Oceanography, WB-10, University of Washington, Seattle, WA 98195, USA
Biofouling; application of biotechnology to marine systems

**Alderdice, D., Dr**
Pacific Biological Station, Nanaimo, B.C., Canada V9R 5K6
Pollution of environmental environments

**Bernhard, M., Dr**
ENEA, PO Box 316, I-19100 La Spezia, Italy
Radioactive and conventional pollution

**Brown, B. E., Dr**
Dept of Biology, The University, Newcastle-upon-Tyne NE1 7RU, England
Effects of man-made and natural disturbances on coral reefs

**Eisler, R., Dr**
US Dept of the Interior, Fish and Wildlife Service, Laurel, MD 20708, USA
Toxicology and pollution

**Elliott, M., Dr** Ⓢ
Dept of Applied Biology, Institute of Estuarine and Coastal Studies, The University, Hull HU6 7RX, England
Marine pollution assessment and control

**Fisher, N. S., Dr**
Marine Sciences Research Center, State Univ. of New York, Stony Brook, NY 11794-5000, USA
Pollutant effects on plankton; radioecology

**Fowler, S. W., Dr** Ⓢ
IAEA, ILMR, Stade Louis II, Entrée C-19, Ave des Castellans, MC-98000 Monaco
Pollution effects on zooplankton; radioecology

**Gray, J., Prof.** Ⓢ
Institutt for Marinbiologi og Limnologi, Univ. Oslo, Postboks 1064, Blindern, Oslo 3, Norway
Pollution effects on benthos animals

**Luoma, S. N., Dr**
US Dept of the Interior, Geological Survey, Water Resources Div., 345 Middlefield Rd, Menlo Park, CA 94025, USA
Bioaccumulation of trace contaminants (principally trace elements and radionuclide waste products)

**Mauchline, J., Dr**
Scottish Marine Biological Ass., Dunstaffnage Marine Research Laboratory, PO Box 3, Oban, Argyll PA34 4AD, Scotland
Radioactive pollution

**McLusky, D. S., Dr** Ⓢ
Dept of Biological Sciences, Univ. Stirling, Stirling FK9 4LA, Scotland
Biological effects of pollutants (petro-, chemical, organic enrichment)

**Peterson, C. H., Prof.** Ⓢ
Institute of Marine Science, Univ. of N. Carolina at Chapel Hill, 3407 Arendell Street, Morehead City, NC 28557, USA
Fisheries management and ecology

**Polikarpov, G. G., Prof.**
Institute of Biology of South Seas, Academy of Sciences Uk. SSR, 2, Nahimov St., Sevastopol 335000, Ukraine
Chemical ecology, radioecology, radiotracers, pollution; protection of sea life

**Sherman, K., Dr** Ⓢ
US Dept of Commerce, NOAA, Northeast Fisheries Center, 28 Tarzwell Dr., Narragansett, RI 02882, USA
Fisheries ecology; fishery resources; zooplankton

**Westernhagen, H. von, Dr**
Biologische Anstalt Helgoland, Notkestr. 31, D-22607 Hamburg, Germany
Fish egg and larval survival

**Wu, B. L., Prof.**
First Institute of Oceanography, State Oceanic Administration, PO Box 98, Qingdao, People's Republic of China
Effects of pollutants on benthic organisms

# CONTENTS

## Volume 105 · Numbers 1 and 2 · 1994


**RESEARCH ARTICLES**

**Andersen, L. W., Siegismund, H. R.**
Genetic evidence for migration of males between schools of the long-finned pilot whale *Globicephala melas* 1–7

**Olesen, N. J., Frandsen, K., Riisgård, H. U.**
Population dynamics, growth and energetics of jellyfish *Aurelia aurita* in a shallow fjord 9–18

**Soetaert, K., Herman, P. M. J.**
One foot in the grave: zooplankton drift into the Westerschelde estuary (The Netherlands) 19–29

**González, H. E., González, S. R., Brummer, G.-J. A.**
Short-term sedimentation pattern of zooplankton, faeces and microplankton at a permanent station in the Bjørnafjorden (Norway) during April–May 1992 31–45

**Ray, M., Stoner, A. W.**
Experimental analysis of growth and survivorship in a marine gastropod aggregation: balancing growth with safety in numbers 47–59

**Trowbridge, C. D.**
Defensive responses and palatability of specialist herbivores: predation on NE Pacific ascoglossan gastropods 61–70

**Kennedy, A. D.**
Carbon partitioning within meiobenthic nematode communities in the Exe Estuary, UK 71–78

**Somerfield, P. J., Gee, J. M., Warwick, R. M.**
Soft sediment meiofaunal community structure in relation to a long-term heavy metal gradient in the Fal estuary system 79–88

**Metaxas, A., Hunt, H. L., Scheibling, R. E.**
Spatial and temporal variability of macrobenthic communities in tidepools on a rocky shore in Nova Scotia, Canada 89–103

**Ormond, R. F. G., Banaimoon, S. A.**
Ecology of intertidal macroalgal assemblages on the Hadramout coast of southern Yemen, an area of seasonal upwelling 105–120

**Burkholder, J. M., Glasgow, H. B. Jr, Cooke, J. E.**
Comparative effects of water-column nitrate enrichment on eelgrass *Zostera marina*, shoalgrass *Halodule wrightii*, and widgeongrass *Ruppia maritima* 121–138

**Kühl, M., Lassen, C., Jørgensen, B. B.**
Light penetration and light intensity in sandy marine sediments measured with irradiance and scalar irradiance fiber-optic microprobes 139–148

**Johnsen, G., Samset, O., Granskog, L., Sakshaug, E.**
*In vivo* absorption characteristics in 10 classes of bloom-forming phytoplankton: taxonomic characteristics and responses to photoadaptation by means of discriminant and HPLC analysis 149–157

**Allali, K., Dolan, J., Rassoulzadegan, F.**
Culture characteristics and orthophosphate excretion of a marine oligotrich ciliate, *Strombidium sulcatum*, fed heat-killed bacteria 159–165

**Eccleston-Parry, J. D., Leadbeater, B. S. C.**
A comparison of the growth kinetics of six marine heterotrophic nanoflagellates fed with one bacterial species 167–177

**Putt, M., Miceli, G., Stoecker, D. K.**
Association of bacteria with *Phaeocystis* sp. in McMurdo Sound, Antarctica 179–189

**Slezak, D. M., Puskaric, S., Herndl, G. J.**
Potential role of acrylic acid in bacterioplankton communities in the sea 191–197

**NOTES**

**Kamiyama, T.**
Effects of extracellular products from phytoplankton on the excystment of tintinnids from marine sediments 199–201

**Pujo-Pay, M., Raimbault, P.**
Improvement of the wet-oxidation procedure for simultaneous determination of particulate organic nitrogen and phosphorus collected on filters 203–207


## Volume 105 · Number 3 · 1994


**RESEARCH ARTICLES**

**Brown, B. E., Le Tissier, M. D. A., Dunne, R. P.**
Tissue retraction in the scleractinian coral *Coeloseris mayeri*, its effect upon coral pigmentation, and preliminary implications for heat balance 209–218

**Brown, B. E., Dunne, R. P., Scoffin, T. P., Le Tissier, M. D. A.**
Solar damage in intertidal corals 219–230

**Guzmán, H. M., Burns, K. A., Jackson, J. B. C.**
Injury, regeneration and growth of Caribbean reef corals after a major oil spill in Panama 231–241

**McGehee, M. A.**
Correspondence between assemblages of coral reef fishes and gradients of water motion, depth, and substrate size off Puerto Rico 243–255

**Whitfield, A. K.**
Abundance of larval and 0+ juvenile marine fishes in the lower reaches of three southern African estuaries with differing freshwater inputs 257–267

**Yamashita, Y., Nagahora, S., Yamada, H., Kitagawa, D.**
Effects of release size on survival and growth of Japanese flounder *Paralichthys olivaceus* in coastal waters off Iwate Prefecture, northeastern Japan 269–276

**Alkemade, R., Wielemaker, A., Herman, P. M. J., Hemminga, M. A.**
Population dynamics of *Diplolaimelloides bruciei*, a nematode associated with the salt marsh plant *Spartina anglica* 277–284

**Pelegrí, S. P., Nielsen, L. P., Blackburn, T. H.**
Denitrification in estuarine sediment stimulated by the irrigation activity of the amphipod *Corophium volutator* 285–290

**Poremba, K.**
Simulated degradation of phytodetritus in deep-sea sediments of the NE Atlantic (47° N, 19° W) 291–299

**Sciandra, A., Amara, R.**
Effects of nitrogen limitation on growth and nitrite excretion rates of the dinoflagellate *Prorocentrum minimum* 301–309

# MARINE ECOLOGY PROGRESS SERIES

**HISTORY:** Marine Ecology Progress Series (MEPS) was established in response to requests from numerous marine ecologists from all over the world. When founded, MEPS was based on 'Marine Ecology' – the first comprehensive, integrated treatise on life in oceans and coastal waters – conceived, organized and edited by Professor Otto Kinne, and published by John Wiley & Sons.

**AIM:** MEPS serves as a world-wide forum for all aspects of marine ecology, fundamental and applied. The journal covers: microbiology, botany, zoology, ecosystem research, biological oceanography, ecological aspects of fisheries and aquaculture, pollution, environmental protection, conservation, resource management.
Ecological research has become of paramount importance for man's future. The information presented here should, therefore, encourage critical application of ecological knowledge for the benefit of mankind and, in fact, of life on earth. Marine Ecology Progress Series has received recognition as the leader in its field. The journal strives for

- complete coverage of the field of marine ecology
- the highest possible quality of scientific contributions
- quick publication
- a high technical standard of presentation.

**SCOPE:** MEPS is international and interdisciplinary. It presents rigorously refereed and carefully selected research articles, reviews and notes, as well as comments, concerned with:

**Environmental Factors:** Tolerances and responses of marine organisms (microorganisms, autotrophic plants, and animals) to variations in abiotic and biotic components of their environment; radioecology.

**Physiological Mechanisms:** Synthesis and transversion of organic material (mechanisms of auto- and heterotrophy); thermo-, ion-, osmo- and volume-regulation; stress resistance; non-genetic and genetic adaptation; population genetics; orientation in space and time; migrations; behavior; molecular basis of ecological processes.

**Cultivation:** Maintenance and rearing of, as well as experimentation with, marine organisms under environmental and nutritional conditions which are, to a considerable degree, controlled; analysis of the physiological and ecological potential of individuals, populations and species; determination of nutritional requirements; ecological aspects of aquaculture; water-quality management; culture technology.

**Dynamics:** Production, transformation, and decomposition of organic matter; flow patterns of energy and matter as these pass through organisms, populations and ecosystems; biodiversity; variability of ecosystem components; trophic interrelations; population dynamics; plankton ecology; benthos ecology; estuarine and coastal ecology; wadden-sea ecology; coral reef ecology; deep-sea ecology; open-ocean ecology; polar ecology; theoretical ecology; ecological methodology; ecological modelling and computer simulation.

**Ocean Management:** Human-caused impacts: their role as modifiers and deformers of living systems, their biological consequences and their management and control; inventory of living resources in coastal areas, estuaries and open oceans; ecological aspects of fisheries; pollution of marine areas and organisms; protection of life in the seas; management of populations, species and ecosystems; management of coastal zones and sea areas; biotechnology.

---

**Publisher: Inter-Research**
Nordbünte 23, D-21385 Oldendorf/Luhe, Germany
Tel: (+49) (0)4132 7127; Fax: (+49) (0)4132 8883; E-mail: 100327.535@compuserve.com

---

**Copyright © Inter-Research, Oldendorf/Luhe, 1994.** All rights reserved. Mar. Ecol. Prog. Ser. 1994. Typesetting by Inter-Research. Printed in Germany by Westholsteinische Verlagsdruckerei Boyens & Co., PO Box 1880, D-25738 Heide.

Scientific publications appearing in this journal have been rigorously refereed, carefully quality-improved, and professionally selected by our editorial staff. These publications, and all parts thereof, are protected by copyright. This covers the exclusive rights of the publisher to *reproduce* (by any means, including photographic or electronic), to *distribute* (including via photocopies, reprints, or electronic means), and to *store* on microfilm, in electronic data bases, on video disks, etc., this material. The acceptance regulations of a manuscript for publication automatically include the consent of the author(s) to transfer the copyright to the publisher. Permission for exceptions to these rules must be obtained in writing from the publisher.
In the USA, photocopies may be made for personal or in-house use beyond the limitations stipulated under Section 107 or 108 of U.S. Copyright Law, provided a fee (US $3.00 per article) is paid to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA.

Publisher, editors and authors do not accept legal responsibility for errors, omissions or claims, nor do they provide any warranty, express or implied, with respect to information published in MEPS.